PIER Energy-Related Environmental Research
Environmental Impacts of Energy Generation, Distribution and Use

Raptor Mortality Field Guide

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Subcontractor: EDM International, Inc.
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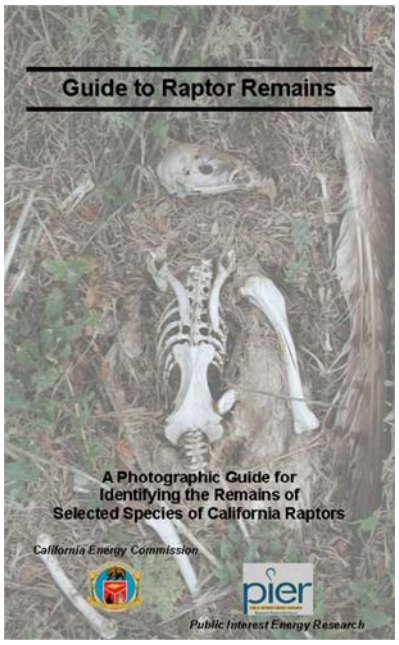
Subcontractor Project Manager: Rick Harness
Commission Project Manager: Brian Walton
Commission Contract Manager: Linda Spiegel

The Issue



Avian electrocution from an electricity power line structure occurs when the bird comes into contact with two energized components of the structure at the same time. A raptor's large size increases the chance of such an event happening, and the large number of power lines in California increases it even further. About 200,000 miles of distribution lines run through the State, and California hosts 21 species of raptors large enough to be at risk, so estimates of many thousands of avian electrocutions occurring annually in California are not surprising. A recent study concludes that the "base case" estimate of the cost of wildlife-caused power outages on the California economy is $34 million each year.[1]

Only rough calculations of electrocution events are available, for a variety of reasons. Limited resources are available for monitoring, predators remove carcasses, and power companies are sometimes reluctant to report fatalities. Moreover, electrocutions that do not affect power services are often undetected. When bird remains are discovered under power structures and reported, often it is difficult to recognize the bird's species, because the carcass has deteriorated or been scavenged. This lack of accurate data has led to generalized solutions that have proven insufficient for addressing a number of species.

For legal, conservation, and retrofitting considerations, it is crucial to identify the species of an avian victim. Some raptor species, such as golden and bald eagles, peregrine falcons, and California condors, are protected by strict laws that contain specific mitigation obligations.

[1] Energy and Environmental Economics, Inc. 2005. *The Cost of Wildlife-Caused Power Outages to California's Economy.* California Energy Commission, PIER Energy-Related Environmental Research. CEC-500-2005-030.

However, other raptor species may only be included in the more general legislative protection of the Migratory Bird Treaty, which may not outline specific mitigation. If a bird's species is undetermined, the proper law cannot be employed.

It is also important to identify a bird's species because each species—and even local populations of the same species—has a different ability to tolerate negative population pressures, based on factors such as life history, migratory habits, and other external influences acting on a population's stability. Therefore, it is critical for researchers to know whether a particularly vulnerable species is being stressed further by interactions with power structures, so that additional steps may be taken to protect that species.

Similarly, it is important to determine the characteristics that contribute to a particular species' vulnerability to electrocution and collisions, so that effective retrofitting measures can be chosen and implemented. Wingspan length and perch preferences are two examples of such characteristics. Without understanding the causes of electrocution for various species, researchers cannot design effective mitigation. Focusing research and mitigation resources on the identified, tangible problems of specific, vulnerable species will help solve the problem of raptor electrocution more quickly, and at a lower cost.

Project Description

The PIER Environmental Area is funding a project by EDM International, Inc. to create a raptor mortality field guide that will allow field researchers and utility personnel to identify bird species by examination of bones, castings, feathers, and other distinguishing features. This guide will help concerned parties determine the degree of impact that collisions and electrocutions have on a particular species, thus enabling utilities and others to develop specific and effective measures to reduce this risk.

The guide will consist of a series of field-worthy laminated photo cards with explanatory text. The cards will compare raptor skeletons, feathers, and castings, and note key identifying markers and measurements. The guide will address common identification problems—such as differentiating between immature bald eagles and golden eagles (which have similar size and coloration)—and compare similar species side by side. Other frequently electrocuted non-raptor species such as the American Crow will be included, because of their similarity in size and their use of electricity power structures.

PIER Program Objectives and Anticipated Benefits for California

This project offers numerous benefits and meets the following PIER program objectives:

- **Providing environmentally sound and safe electricity.** The Raptor Mortality Field Guide will help users reduce raptor electrocution fatalities by identifying particular problem areas and vulnerable species. Once identified, the proper corrective measures can be pursued with confidence.

- **Providing reliable electricity.** The Raptor Mortality Field Guide will be an invaluable component in the effort to reduce power outages attributable to avian interactions with power lines. The ability to identify species that are frequently involved in such

interactions will also help electric utilities determine suitable and effective power structure retrofits.

- **Providing affordable energy services.** This guide will improve the energy cost/value of California's electricity by enabling power structures to be retrofit more effectively and at less cost. By using the guide, researchers will be able to collect data that will help identify which species are more often victims of electrocution. That information will allow them to develop profiles of physical and behavioral characteristics that put a species at risk, which will directly influence the development of appropriate retrofitting measures.

Results

The Raptor Mortality Field Guide was presented in a workshop at the Raptor Research Foundation's annual North American meeting in November 2004, and the revised guide was published in January 2005.

Final Report

The final report on this work, *Guide to Raptor Remains: A Photographic Guide for Identifying the Remains of Selected Species of California Raptors* (CEC-500-2005-001), is available at the Energy Commission website, at: www.energy.ca.gov/2005publications/CEC-500-2005-001/CEC-500-2005-001.PDF.

Contact

Linda Spiegel • 916-654-4703 • lspiegel@energy.state.ca.us